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10/073,751	02/09/2002	Arjun Kar Roy	01CON211P	4492

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FARJAMI & FARJAMI LLP
16148 SAND CANYON
IRVINE, CA 92618

EXAMINER
CHU, CHRIS C

ART UNIT	PAPER NUMBER
2815	

DATE MAILED: 05/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/073,751	KAR ROY ET AL.	
	Examiner	Art Unit	
	Chris C. Chu	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 February 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 - 18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 - 18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *21 February 2003* is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on February 21, 2003 has been received and entered in the case.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 10 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsunemitsu et al.

Regarding claim 10, Tsunemitsu et al. discloses in Fig. 2 an integrated circuit chip comprising:

- a first interconnect metal layer (14);

- a first intermetallic dielectric layer (15) situated over said first interconnect metal layer;
- a metal resistor (16) situated over said first intermetallic dielectric layer and below a second intermetallic dielectric layer (17);
- a second interconnect metal layer (28) over said second intermetallic dielectric layer;
- a first intermediate via (the place of a connecting structure between 14 and 16, the left) connected to a first terminal of said metal resistor;
- a second intermediate via (the place of a connecting structure between 14 and 16, the right) connected to a second terminal of the metal resistor.

Regarding claim 16, Tsunemitsu et al. discloses in Fig. 2 and column 3, line 41 the first interconnect metal layer (14) comprising aluminum.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsunemitsu et al. in view of Kumar.

Regarding claim 1, Tsunemitsu et al. discloses in Fig. 2 an integrated circuit chip comprising:

- a first interconnect metal layer (14);
- a first intermetallic dielectric layer (15) situated over said first interconnect metal layer;
- a metal resistor (16) situated over said first intermetallic dielectric layer and below a second intermetallic dielectric layer (17);
- a second interconnect metal layer (28) over said second intermetallic dielectric layer;
- a first intermediate via (the place of a connecting structure between 16 and 28) connected to a first terminal of said metal resistor, said first intermediate via being further connected to a first metal segment patterned in said second interconnect metal layer.

Tsunemitsu et al. does not disclose the claimed invention except for a second intermediate via and a second metal segment patterned in the second interconnect metal layer. However, Kumar discloses in Fig. 30 a second intermediate via (84, second from left) connected to a second terminal of a metal resistor (48), the second intermediate via being further connected to a second metal segment patterned (94) in a second interconnect metal layer. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Tsunemitsu et al. by using the second intermediate via and the second metal segment patterned in the second interconnect metal layer as taught by Kumar. The ordinary artisan would have been motivated to modify Tsunemitsu et al. in the manner described above for at least the purpose of increasing electrical connections (column 5, line 50).

Regarding claim 3, Tsunemitsu et al. discloses in Fig. 2 and column 3, line 41 the first interconnect metal layer (14) comprising aluminum.

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsunemitsu et al. and Kumar as applied to claim 1 above, and further in view of Kato et al.

Tsunemitsu et al. and Kumar disclose the claimed invention except for the metal resistor being tantalum nitride. However, Kato et al. discloses in column 3, lines 32 ~ 33 a metal resistor being tantalum nitride. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Tsunemitsu et al. by using tantalum nitride for the metal resistor as taught by Kato et al. The ordinary artisan would have been motivated to further modify Tsunemitsu et al. in the manner described above for at least the purpose of preventing a short circuit problem (column 3, lines 35 and 36).

7. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsunemitsu et al. in view of Kumar.

Tsunemitsu et al. discloses the claimed invention except for the first intermetallic dielectric layer comprising silicon dioxide and the second intermetallic dielectric layer comprising undoped silica glass. However, it is well known in the art to use silicon dioxide for the first intermetallic dielectric layer and undoped silica glass for the second intermetallic dielectric layer. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use silicon dioxide for the first intermetallic dielectric layer and undoped silica glass for the second intermetallic dielectric layer, since it has been held to be within the

general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. The ordinary artisan would have been motivated to modify Tsunemitsu et al. in the manner described above for at least the purpose of providing electronic ceramics in the package.

Further, as to the language on line 2 of claim 4, "HDPCVD", even though product-by-process claims are limited by and defined by the process, determination of patentability is based upon the product itself. The patentability of a product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process. In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted). A "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, **190 USPQ 15 at 17** (footnote 3). See also In re Brown, **173 USPQ 685**: In re Luck, **177 USPQ 523**; In re Fessmann, **180 USPQ 324**: In re Avery, **186 USPQ 116**; In re Wertheim, **191 USPQ 90 (209 USPQ 254** does not deal with this issue); and In re Marosi et al., **218 USPQ 289** final product per se which must be determined in a "product by, all of" claim, and not the patentability of the process, and that an old or obvious product, whether claimed in "product by process" claims or not. Note that Applicant has the burden of proof in such cases, as the above caselaw makes clear.

8. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsunemitsu et al. and Kumar as applied to claim 1 above, and further in view of Yaung et al.

Regarding claim 6, Tsunemitsu et al. and Kumar disclose the claimed invention except for a dielectric cap layer. However, Yaung et al. discloses in Fig. 4 a dielectric cap layer (30) situating between a resistor (26) and a second intermetallic dielectric layer (34). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Tsunemitsu et al. by using the dielectric cap layer as taught by Yaung et al. The ordinary artisan would have been motivated to further modify Tsunemitsu et al. in the manner described above for at least the purpose of providing precisely controlled resistance (column 2, lines 10 ~ 12).

Regarding claim 7, Yaung et al. discloses in column 3, line 49 the dielectric cap layer comprising silicon nitride.

9. Claims 8 and 9 are rejected under 35 U.S.C: 103(a) as being unpatentable over Tsunemitsu et al. and Kumar as applied to claim 1 above, and further in view of Ohkawa et al.

Regarding claim 8, Tsunemitsu et al. and Kumar disclose the claimed invention except for an oxide cap layer. However, Ohkawa et al. discloses in Fig. 8 an oxide cap layer (5) situating between a metal resistor (4) and a dielectric layer (63). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Tsunemitsu et al. by using the oxide cap layer as taught by Ohkawa et al. The ordinary artisan would have been motivated to further modify Tsunemitsu et al. in the manner described above for at least the purpose of reducing the influence of the reflected light from the lower layer of the laser beams (column 3, lines 1 ~ 7).

Regarding claim 9, Ohkawa et al. discloses in column 4, lines 33 and 34 the oxide cap layer comprising silicon dioxide. Further, as to the language on line 2 of claim 9, "PECVD", even though product-by-process claims are limited by and defined by the process, determination of patentability is based upon the product itself. The patentability of a product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process. In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted). A "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, **190 USPQ 15 at 17** (footnote 3). See also In re Brown, **173 USPQ 685**: In re Luck, **177 USPQ 523**; In re Fessmann, **180 USPQ 324**: In re Avery, **186 USPQ 116**; In re Wertheim, **191 USPQ 90 (209 USPQ 254** does not deal with this issue); and In re Marosi et al., **218 USPQ 289** final product per se which must be determined in a "product by, all of" claim, and not the patentability of the process, and that an old or obvious product, whether claimed in "product by process" claims or not. Note that Applicant has the burden of proof in such cases, as the above caselaw makes clear.

10. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsunemitsu et al. in view of Kato et al.

Regarding claim 11, Tsunemitsu et al. discloses the claimed invention except for the metal resistor being tantalum nitride. However, Kato et al. discloses in column 3, lines 32 ~ 33 a metal resistor being tantalum nitride. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Tsunemitsu et al. by using tantalum nitride

for the metal resistor as taught by Kato et al. The ordinary artisan would have been motivated to modify Tsunemitsu et al. in the manner described above for at least the purpose of preventing a short circuit problem (column 3, lines 35 and 36).

11. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsunemitsu et al.

Tsunemitsu et al. discloses the claimed invention except for the first intermetallic dielectric layer comprising silicon dioxide and the second intermetallic dielectric layer comprising undoped silica glass. However, it is well known in the art to use silicon dioxide for the first intermetallic dielectric layer and undoped silica glass for the second intermetallic dielectric layer. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use silicon dioxide for the first intermetallic dielectric layer and undoped silica glass for the second intermetallic dielectric layer, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. The ordinary artisan would have been motivated to modify Tsunemitsu et al. in the manner described above for at least the purpose of providing electronic ceramics in the package.

Further, as to the language on line 2 of claim 12, "HDPCVD", even though product-by-process claims are limited by and defined by the process, determination of patentability is based upon the product itself. The patentability of a product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different

process. In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted). A "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, **190 USPQ 15 at 17** (footnote 3). See also In re Brown, **173 USPQ 685**: In re Luck, **177 USPQ 523**; In re Fessmann, **180 USPQ 324**: In re Avery, **186 USPQ 116**; In re Wertheim, **191 USPQ 90 (209 USPQ 254** does not deal with this issue); and In re Marosi et al., **218 USPQ 289** final product per se which must be determined in a "product by, all of" claim, and not the patentability of the process, and that an old or obvious product, whether claimed in "product by process" claims or not. Note that Applicant has the burden of proof in such cases, as the above caselaw makes clear.

12. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsunemitsu et al. in view of Yaung et al.

Regarding claim 14, Tsunemitsu et al. discloses the claimed invention except for a dielectric cap layer. However, Yaung et al. discloses in Fig. 4 a dielectric cap layer (30) situating between a resistor (26) and a second intermetallic dielectric layer (34). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Tsunemitsu et al. by using the dielectric cap layer as taught by Yaung et al. The ordinary artisan would have been motivated to modify Tsunemitsu et al. in the manner described above for at least the purpose of providing precisely controlled resistance (column 2, lines 10 ~ 12).

Regarding claim 15, Yaung et al. discloses in column 3, line 49 the dielectric cap layer comprising silicon nitride.

13. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsunemitsu et al. in view of Ohkawa et al.

Regarding claim 17, Tsunemitsu et al. discloses the claimed invention except for an oxide cap layer. However, Ohkawa et al. discloses in Fig. 8 an oxide cap layer (5) situating between a metal resistor (4) and a dielectric layer (63). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Tsunemitsu et al. by using the oxide cap layer as taught by Ohkawa et al. The ordinary artisan would have been motivated to modify Tsunemitsu et al. in the manner described above for at least the purpose of reducing the influence of the reflected light from the lower layer of the laser beams (column 3, lines 1 ~ 7).

Regarding claim 18, Ohkawa et al. discloses in column 4, lines 33 and 34 the oxide cap layer comprising silicon dioxide. Further, as to the language on line 2 of claim 9, "PECVD", even though product-by-process claims are limited by and defined by the process, determination of patentability is based upon the product itself. The patentability of a product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process. In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted). A "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, **190 USPQ 15 at 17** (footnote 3). See also In re Brown, **173 USPQ 685**: In re Luck, **177 USPQ 523**; In re Fessmann, **180 USPQ 324**: In re Avery, **186 USPQ 116**; In re Wertheim, **191 USPQ 90 (209 USPQ 254** does not deal with this issue); and In re Marosi et al., **218 USPQ 289** final product per se which must be determined in a "product by, all of" claim, and not the patentability of the process, and that an old or obvious product, whether claimed in "product by

process" claims or not. Note that Applicant has the burden of proof in such cases, as the above caselaw makes clear.

Response to Arguments

14. Applicant's arguments filed on February 21, 2003 have been fully considered but they are not persuasive.

On page 4, applicant argues "Tsunemitsu '017 does not teach, disclose, or suggest a chip that includes the above recited limitations specified by claim 10. Tsunemitsu '017 discloses a method for producing a thin film passive circuit element. In particular, Tsunemitsu '017 teaches semiconductor device 20 including resistor 16 connected to aluminum wiring path 14 and aluminum wiring path 28. Aluminum wiring path 14 is situated in a lower metal layer than aluminum wiring path 28. Resistor 16 is connected to aluminum wiring path 28 by a single connection. For the foregoing reasons, Applicants respectfully submit that the present invention, as defined by independent claim 10, is not suggested, disclosed, or taught by Tsunemitsu '017." This argument is not persuasive. Since a reference is good for everything it teaches as long as the claim reads on the reference. Therefore, applicant must note that Fig. 2 of Tsunemitsu et al. teaches the invention as claimed in claim 10 (see paragraph five of this Office action). Further, since aluminum wiring path 14 and aluminum wiring path 28 of Tsunemitsu et al. are metal layers, the layers 14 and 28 read as first and second interconnect metal layers. Furthermore, the resistor 16 has first and second intermediate vias and the vias are connected to first and second terminal of the metal resistor. Therefore, Tsunemitsu et al. anticipates the limitation.

Further, applicant argues "Tsunemitsu '017 teaches away from the present invention, as recited in claim 1, because Tsunemitsu '017 teaches connecting a resistor to a metal layer that is closer to the substrate, which increases parasitic capacitance." Since the argument is directed more to mere recognition of latent properties in Tsunemitsu rather than pointing out specific structural differences, this argument is not persuasive

Furthermore, applicant argues "Kumar '572 does not teach, disclose, or suggest a metal resistor situated between a first interconnect metal layer and a second interconnect metal layer because Kumar '572 only teaches a resistor 48 situated beneath electrical connections 92 and 94." This argument is not persuasive because the only teaching that the examiner is relying from Kumar is the teaching of a second intermediate via which connects a second terminal of a metal resistor and a second metal segment patterned in a second interconnect metal layer.

For the above reasons, the rejection is maintained.

Conclusion

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is (703) 305-6194. The examiner can normally be reached on M-F (10:30 - 7:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Chris C. Chu
Examiner
Art Unit 2815

EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

c.c.
May 19, 2003